Neuroscience Careers

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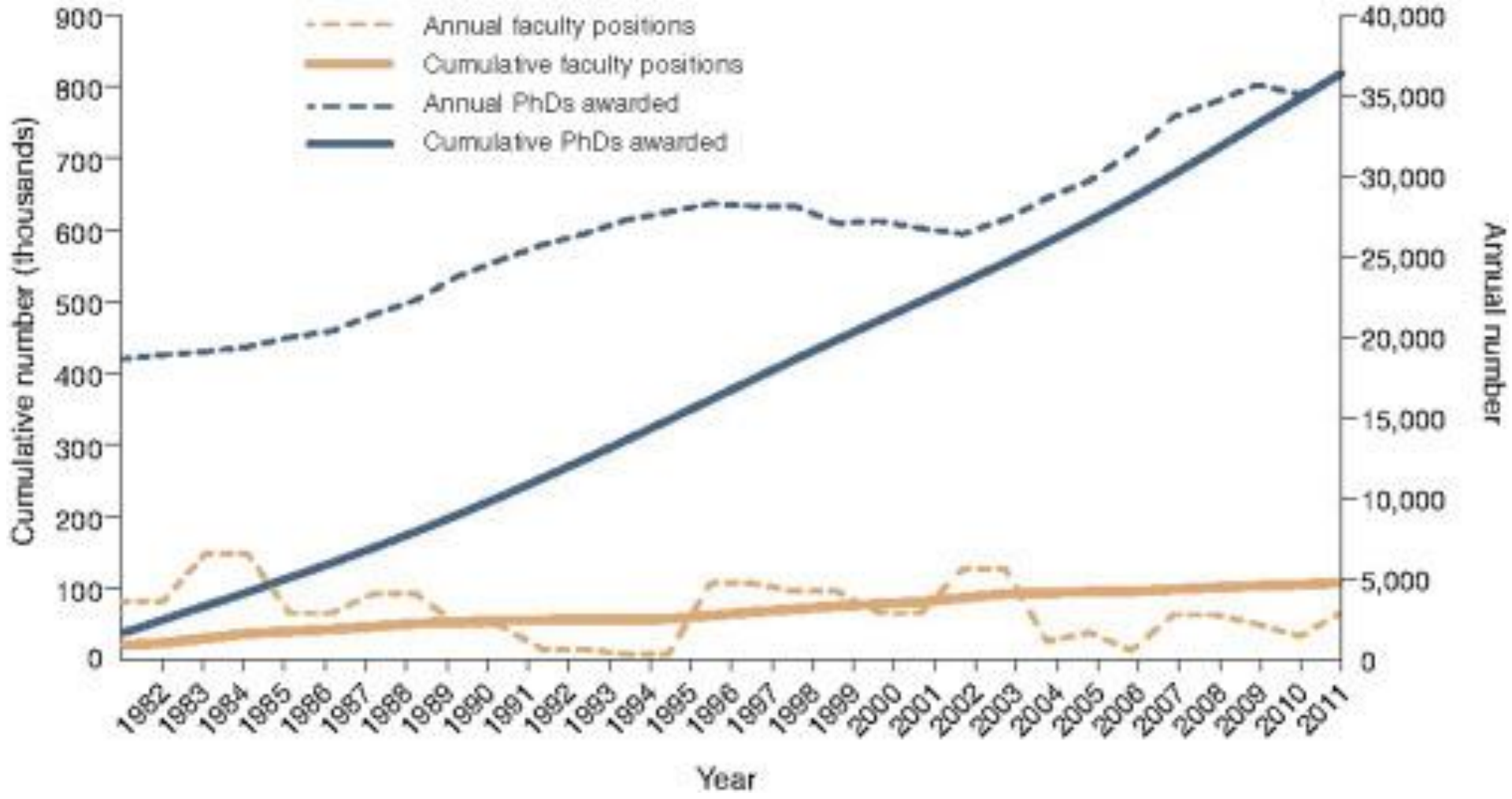
THE PLANS:

THE PLAN YOU TELL YOUR ADVISOR : "I'M GOING TO BE A PROFESSOR AT A MAJOR RESEARCH UNIVERSITY AFTER I GRADUATE."

THE REAL PLAN : LOOK FOR CAREER ALTERNATIVES.

THE SECRET PLAN : BECOME A BAKER/ROCKSTAR/WRITER.

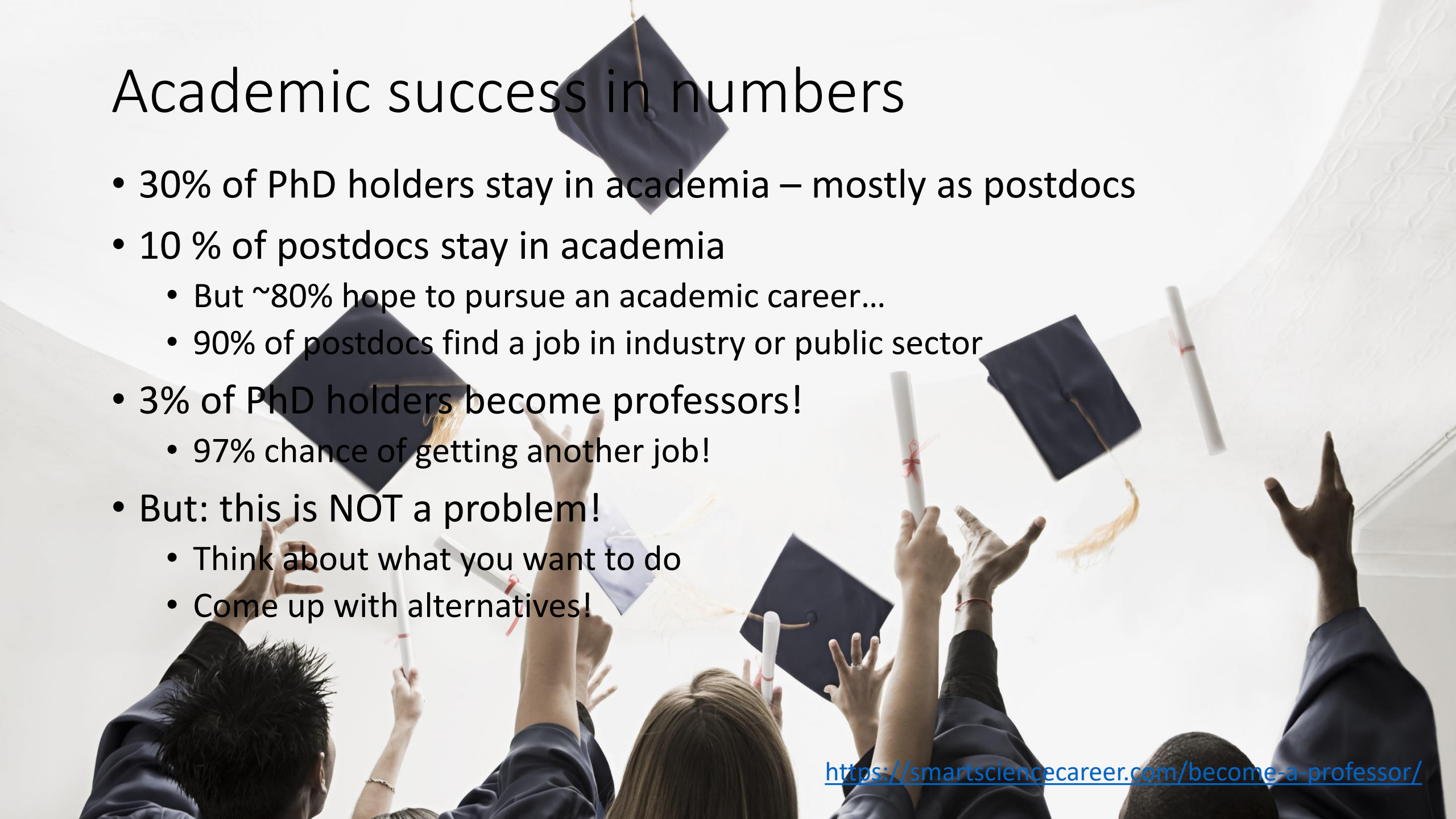
Bad news – competition in academia



https://www.sciencedirect.com/science/article/pii/S0896627316302094

Academic success in numbers

- 30% of PhD holders stay in academia – mostly as postdocs
- 10 % of postdocs stay in academia
  - But ~80% hope to pursue an academic career…
  - 90% of postdocs find a job in industry or public sector
- 3% of PhD holders become professors!
  - 97% chance of getting another job!
- But: this is NOT a problem!
  - Think about what you want to do
  - Come up with alternatives!

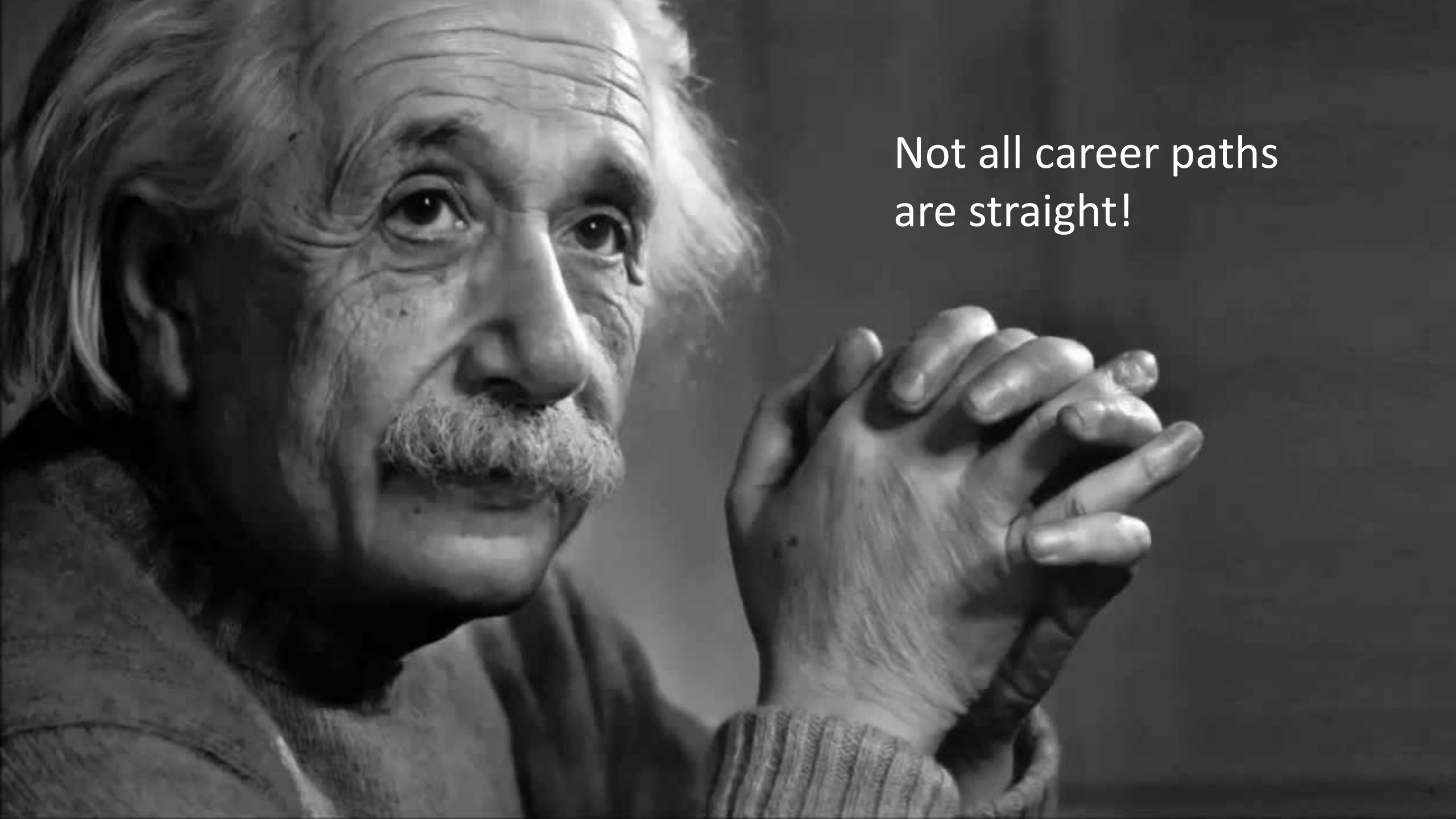


https://smartsciencecareer.com/become-a-professor/

Good news: many diverse sectors…

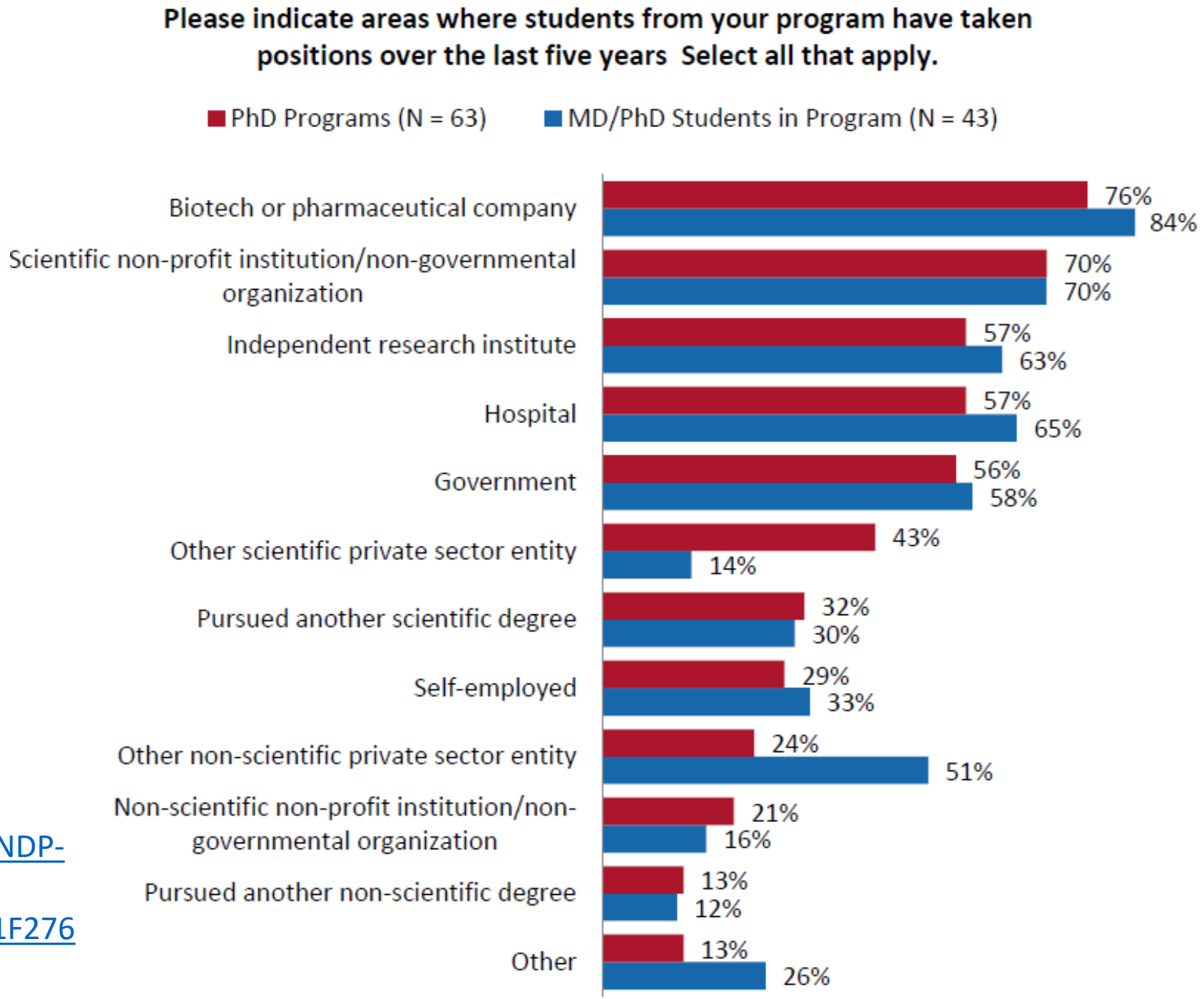
- Research and education
- Health Professional
- Global Health
- Business & Law
- Government & Policy
- Writing & publishing
- Consulting
- Non-profit research / foundations
- Creative sector
- Quantitative fields (data science, AI, investment, …)

Detailed jobs here: https://pni.princeton.edu/undergraduate-concentration/careers-neuroscience


Not all career paths
are straight!

Career stats (USA)

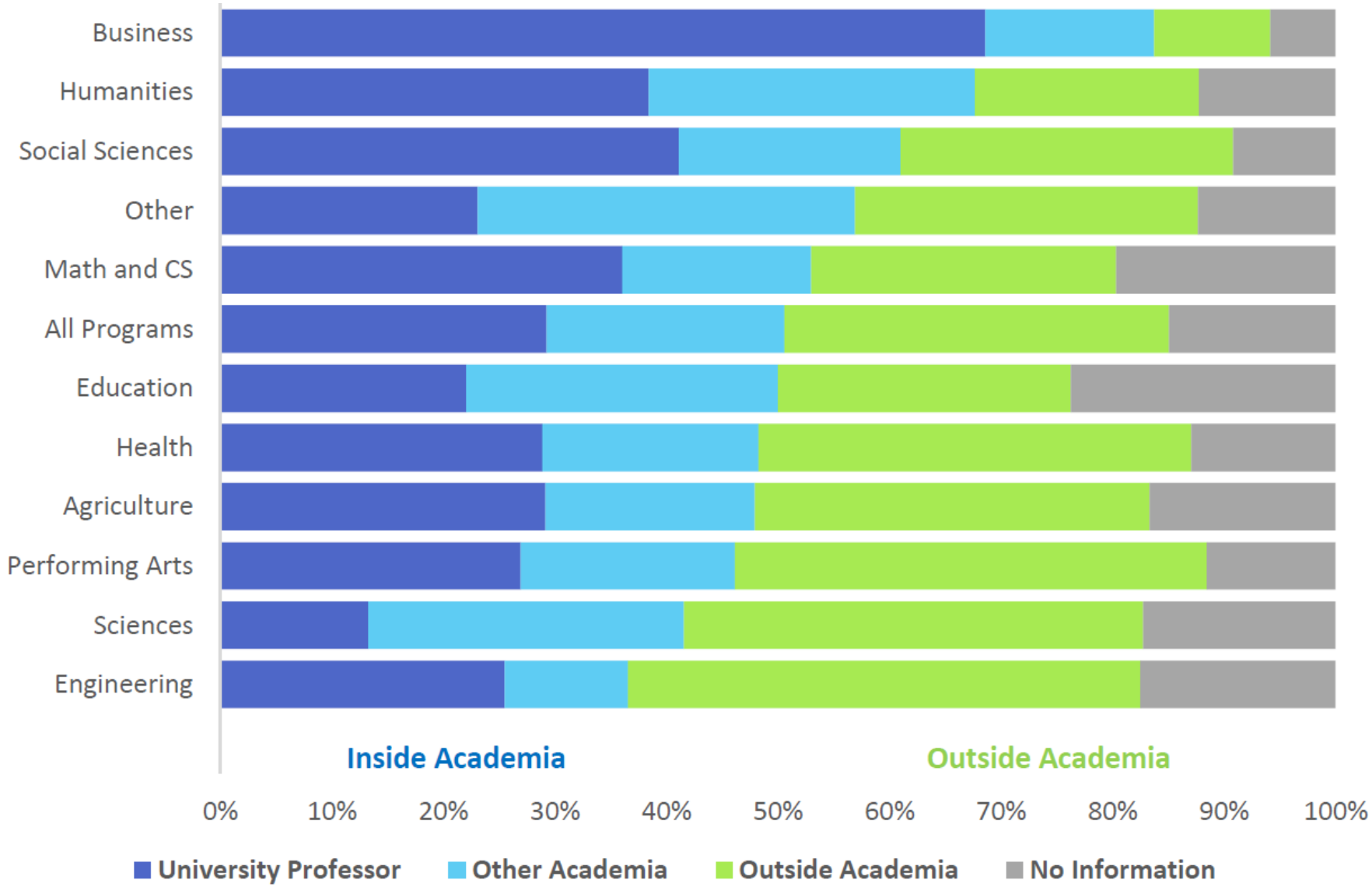
- SfN survey 2017



https://www.sfn.org/-/media/SfN/Documents/Survey-Reports/NDP-Final-Report.ashx?la=en&hash=41FEFFA45C371F27648DF48DB0A11E46A19171E0

Canadian (Ontario) stats

- 2016 survey
- What do 2009 PhDs do?



http://www.heqco.ca/SiteCollectionDocuments/Ontario%27s-PhD-Graduates-from-2009-ENG.pdf

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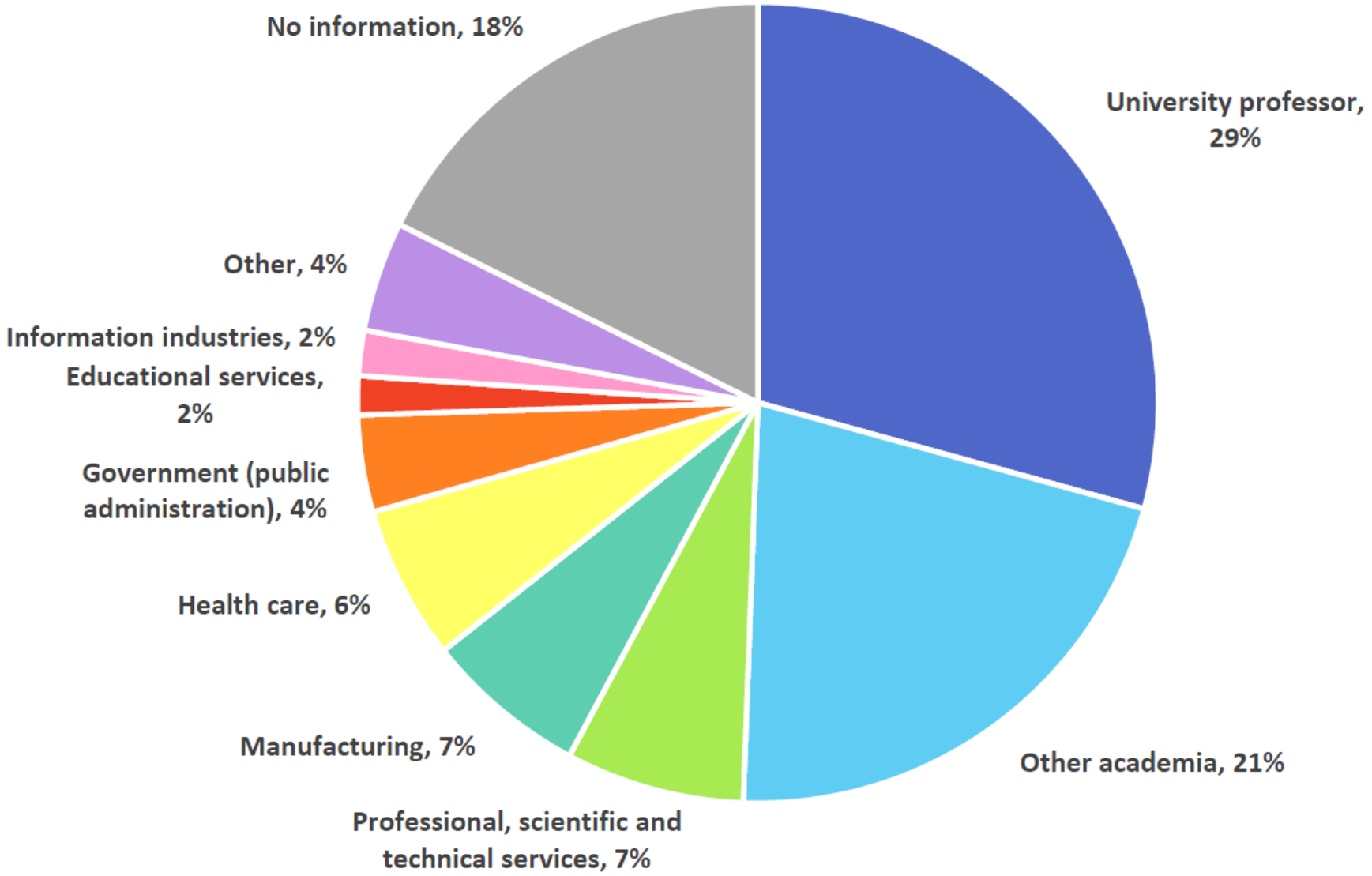
- 2016 survey
- What do 2009 PhDs do?

(FYI, here are the psychology stats: https://cpa.ca/docs/File/Publications/PGS_Final_Report_7Dec2016_ENFinal.pdf)



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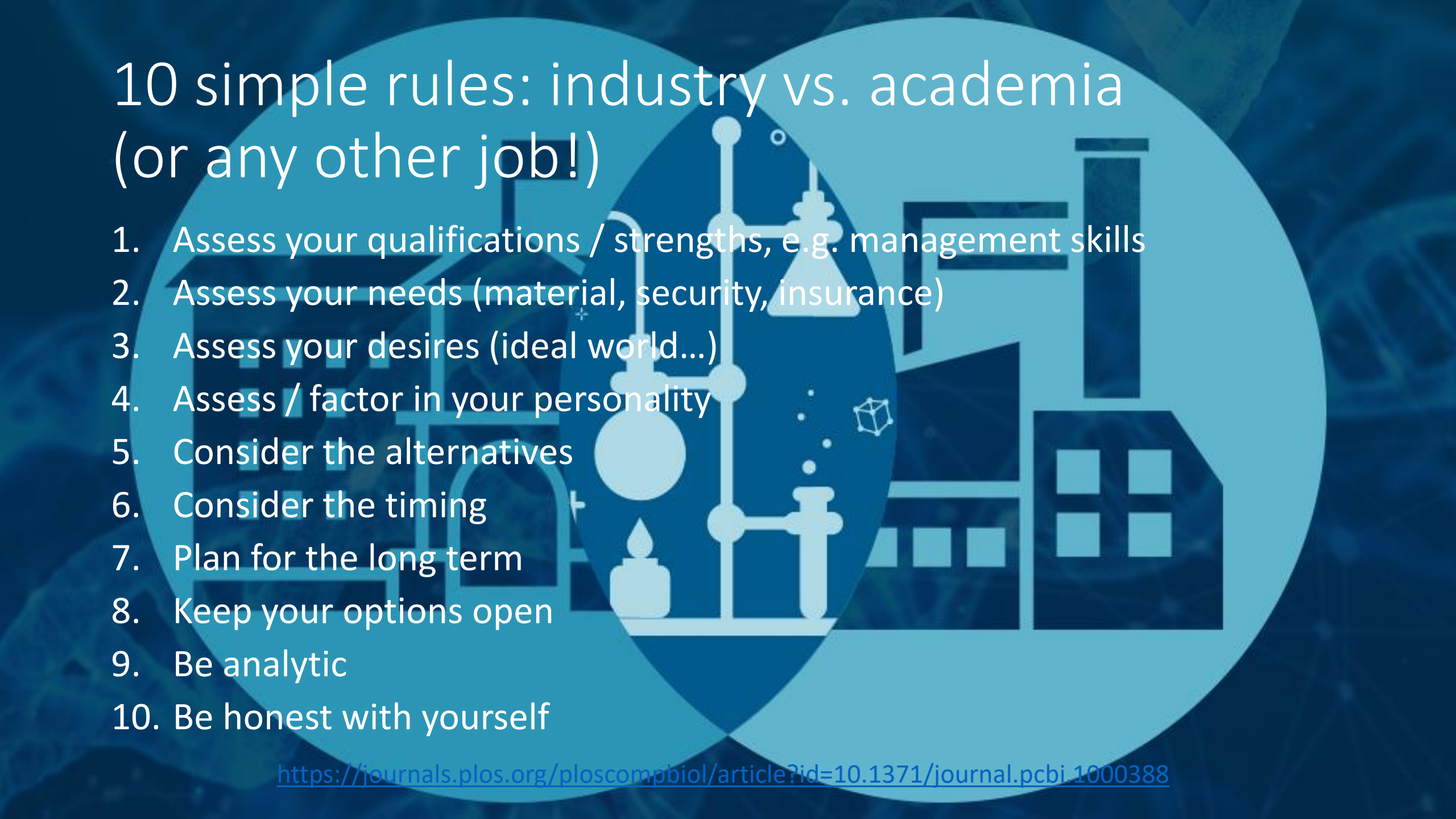
10 simple rules: a job in academia vs. government

1. “public good” means different things
2. Rewards / recognitions are different / on different time scales
3. Government is more hierarchical than academia
4. Government offers better job security
5. Academia generally pays better
6. Both require persistence & patience, but differently
7. Hard to effect change in government, but changes are likely more persistent
8. Academia and government work differently with private sector
9. Accountability is on a different scale
10. Access to resources is different

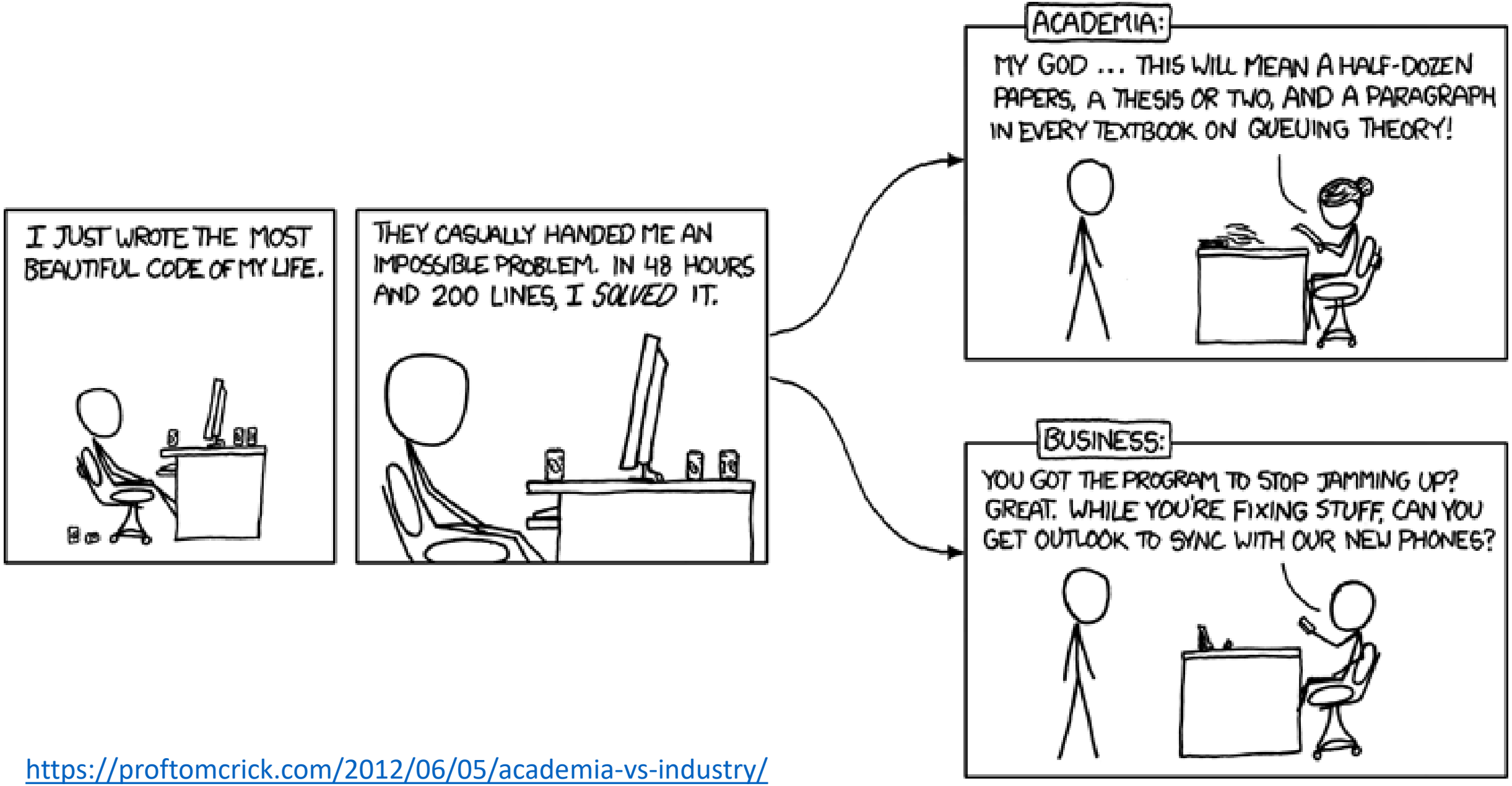
https://pdfs.semanticscholar.org/da11/8775c7f61dc549c4ac7a7e5da9aee3149037.pdf

10 simple rules: industry vs. academia (or any other job!)



1. Assess your qualifications / strengths, e.g. management skills
2. Assess your needs (material, security, insurance)
3. Assess your desires (ideal world…)
4. Assess / factor in your personality
5. Consider the alternatives
6. Consider the timing
7. Plan for the long term
8. Keep your options open
9. Be analytic
10. Be honest with yourself

https://journals.plos.org/ploscompbiol/article?id=10.1371/journal.pcbi.1000388



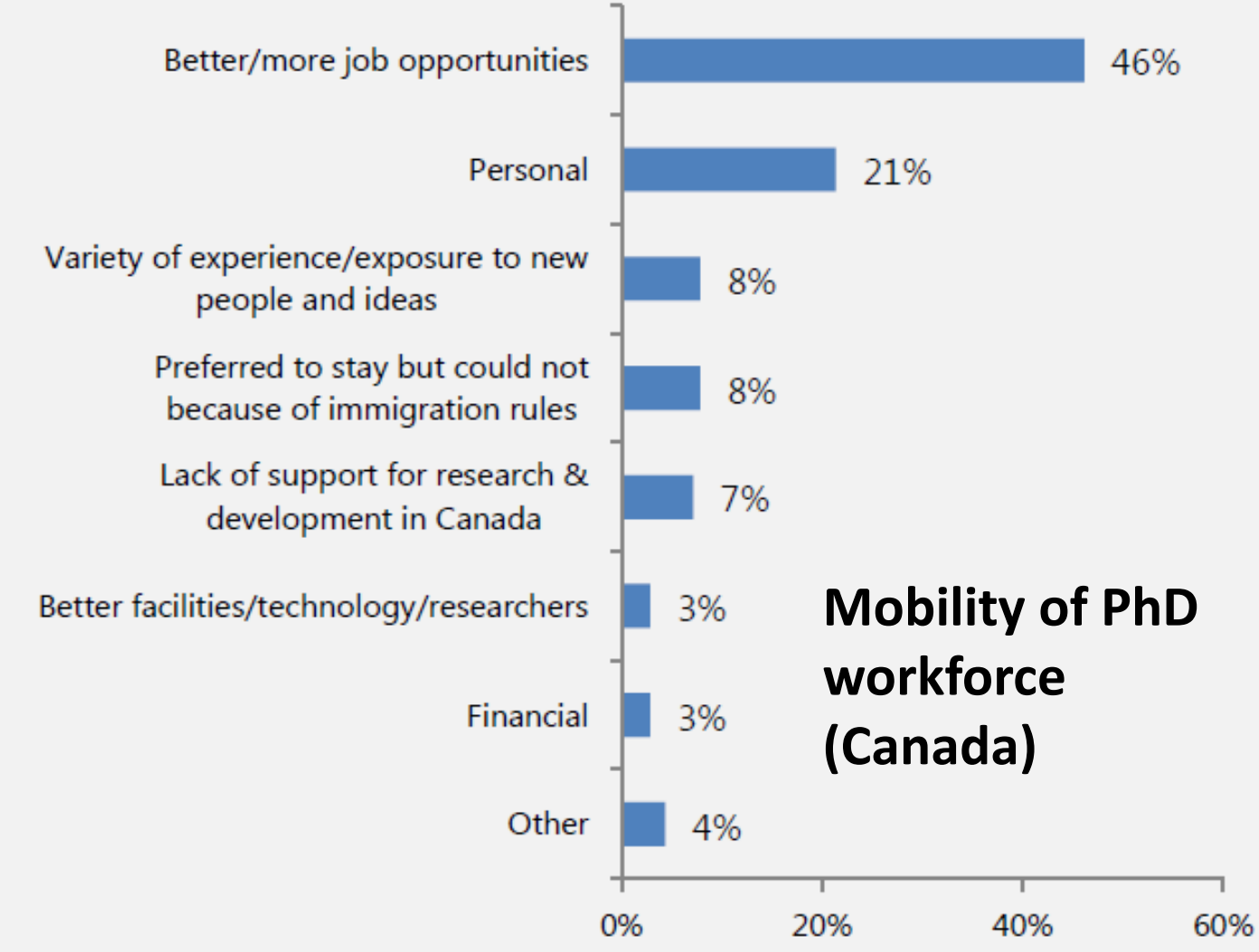
https://proftomcrick.com/2012/06/05/academia-vs-industry/

Succeeding in academia

What it takes in academia

- PhD (5-6 years)
- Multiple postdocs (typically 3-7 years)
- Competitive CV (publications)
- Mobility!

- And <u>some</u> teaching experience!



http://www.caps-acsp.ca/wp-content/uploads/2016/11/English_Executive-summary_2016-CAPS-ACSP-National-Survey.pdf

Finding a great supervisor (avoiding toxic PIs)

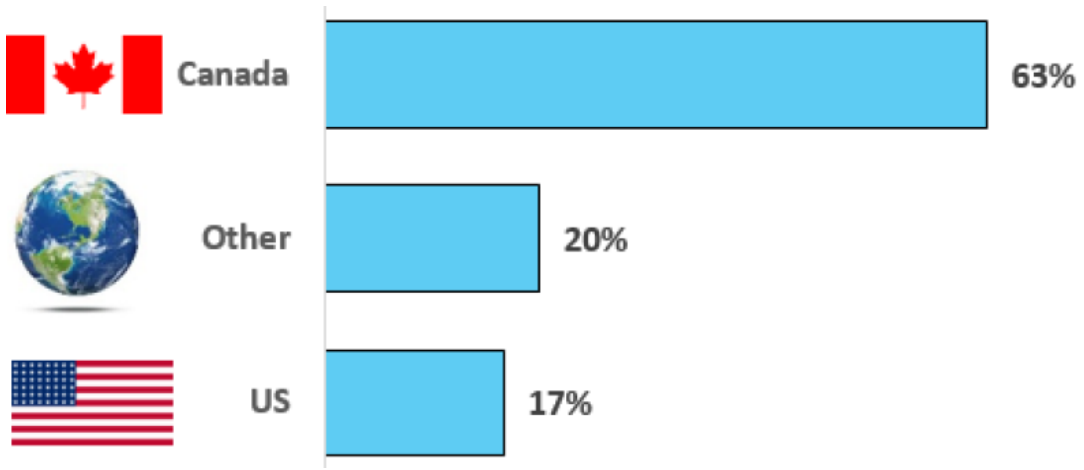
- Ask for recommendations from other academics
- Talk to their trainees!
- Talk to alumni if possible…
- Talk to the program administrative staff
- Ask about professional development / mentorship support
- Investigate the prof's track record of training outcomes (alumni)
- Do trainees get first author publications?
- Is there any evidence for a supportive, collegial lab ambiance?
  - Activities, retreats, get-togethers, trainee initiatives…

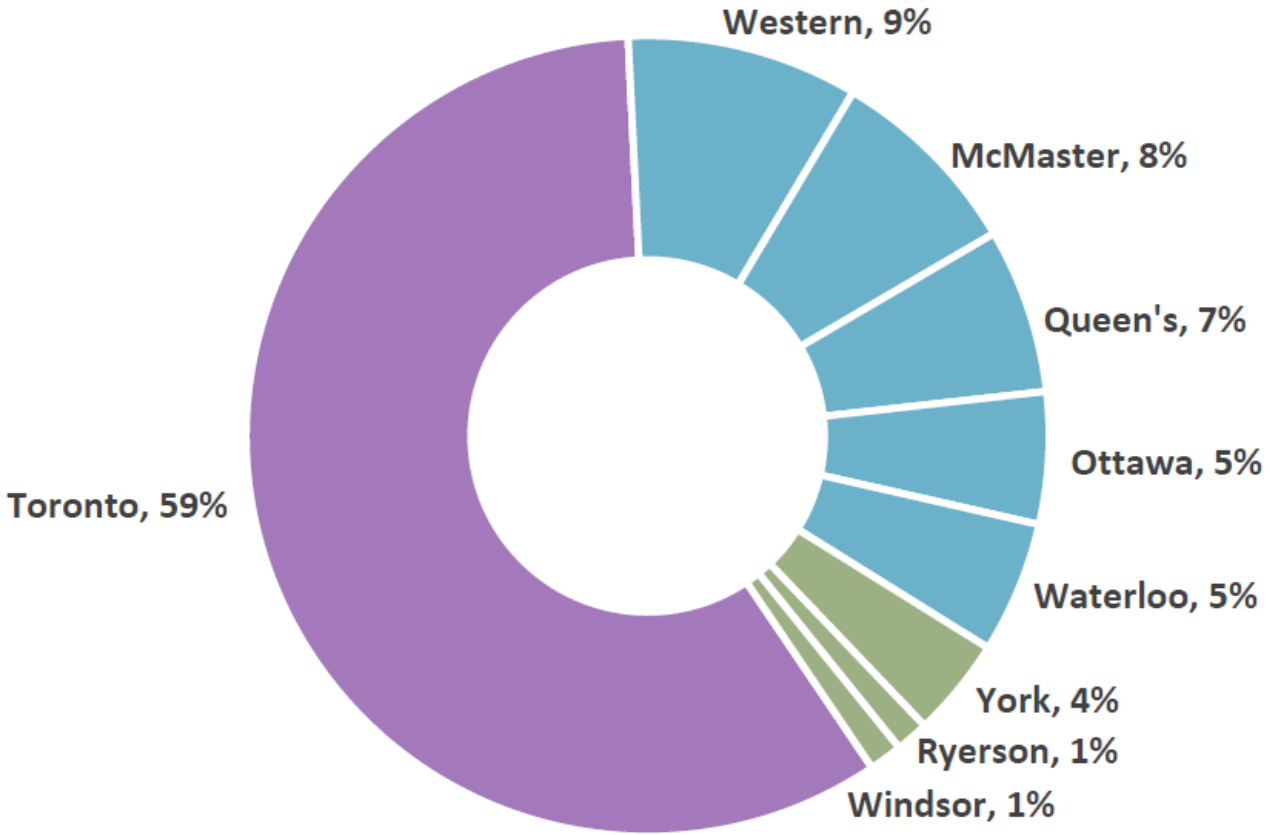
10 simple rules for selecting a postdoc

1. Select a position that excites you
2. Select a lab that suits your work and life style
3. Select a lab and project that develop new skills
4. Have a backup plan
5. Chose project with tangible outcomes that match your career goals
6. Negotiate first authorship before you start
7. The time in a postdoc should be finite
8. Evaluate the growth path
9. Strive to get your own money!
10. Learn to recognize **opportunities**

https://journals.plos.org/ploscompbiol/article?id=10.1371/journal.pcbi.0020121

Where Ontario graduates end up as profs…





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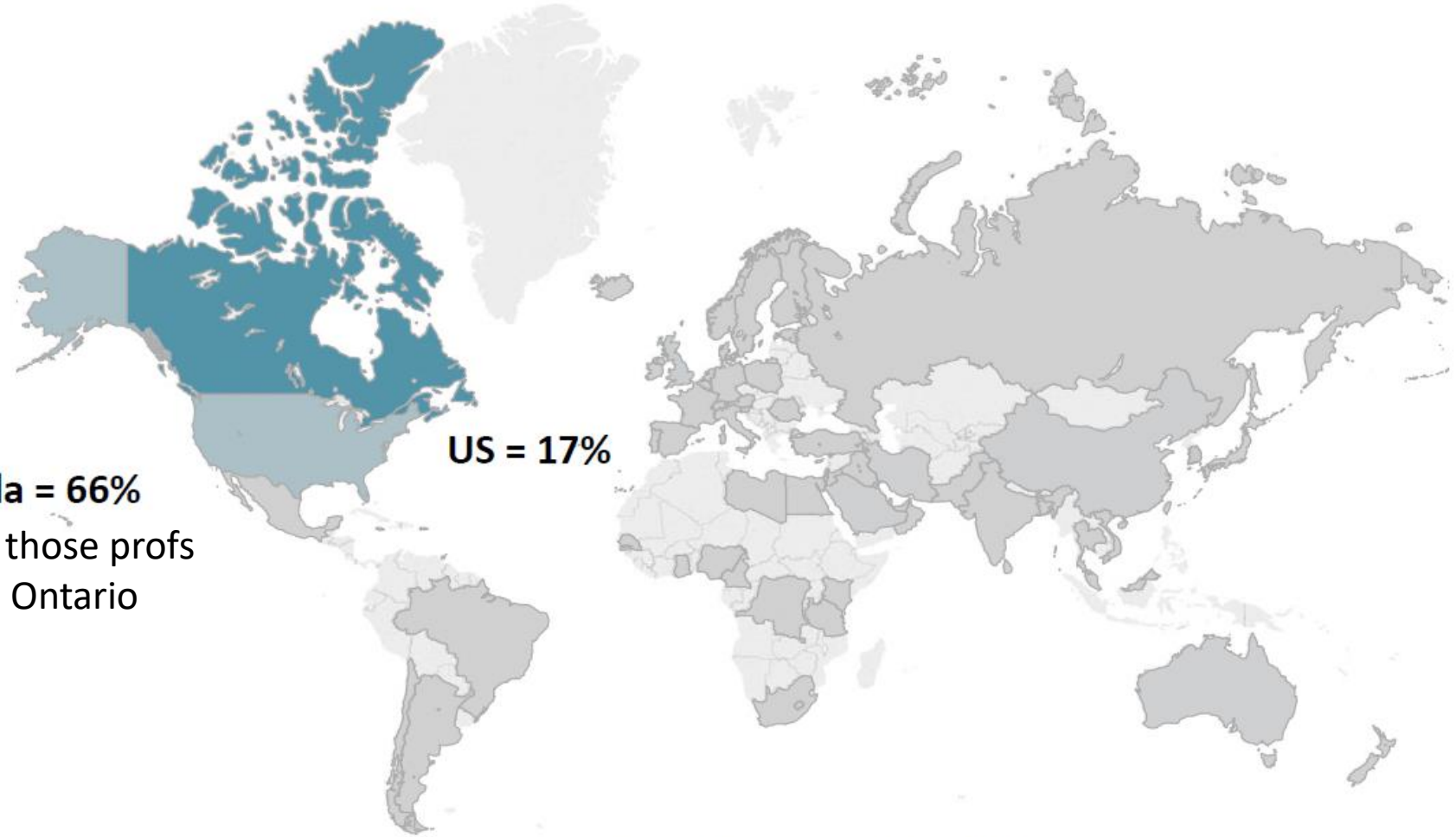

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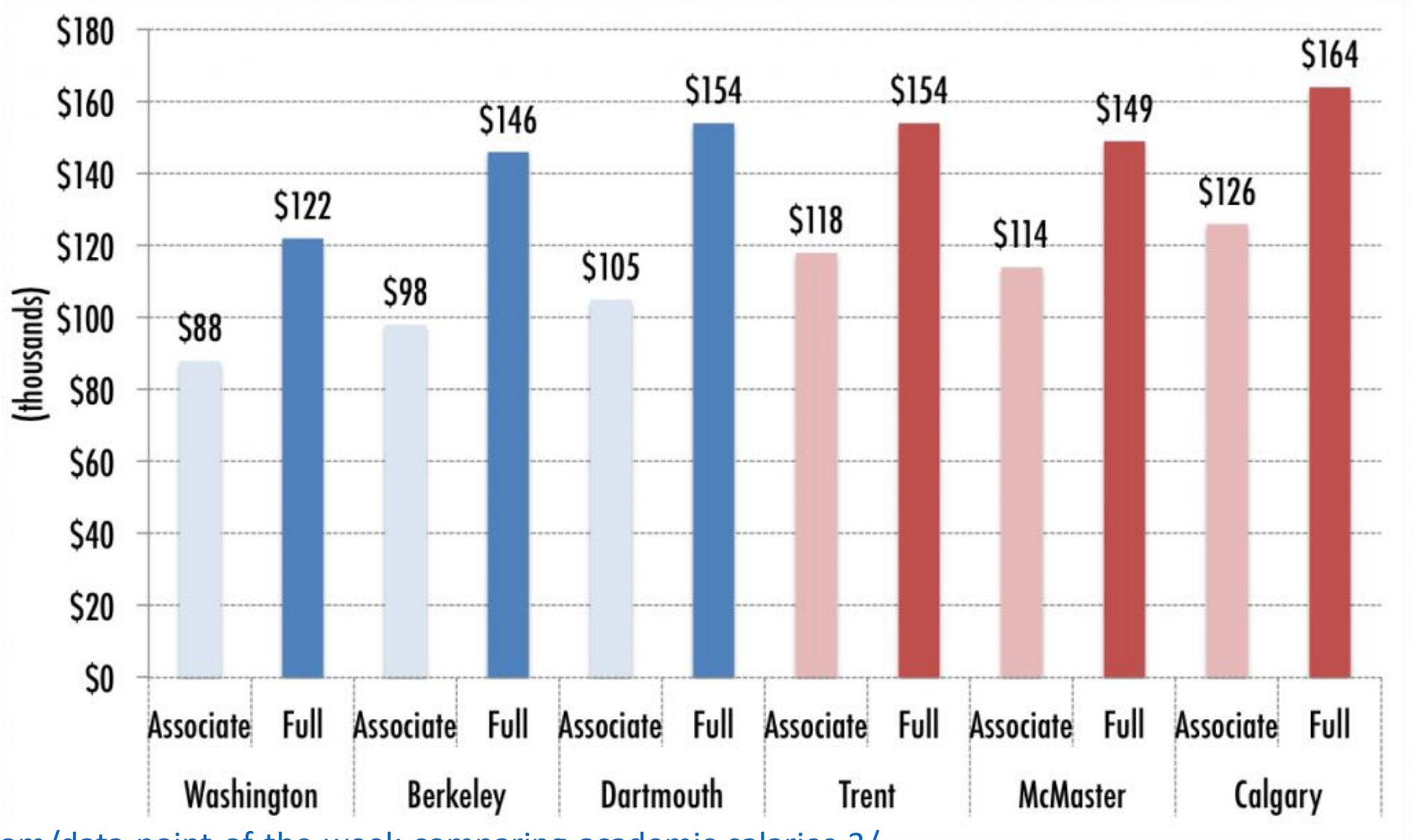
Assistant Professor expectations / timeline

- Types of positions
  - Visiting / adjunct professor
  - Lecturer
  - Tenure-track (aka The Promised Land)
- Tenure-track timeline
  - Typically review and renewal after 3 years
  - Application for tenure & promotion after 6 years
- Expectations for tenure
  - Good teaching record and evaluations
  - Good research record / publications + evidence of extramural funding
  - Good service record to institution and community
  - Independent expert evaluations are positive
- **You are solely responsible for your own success!!!**
- Importance of networking…

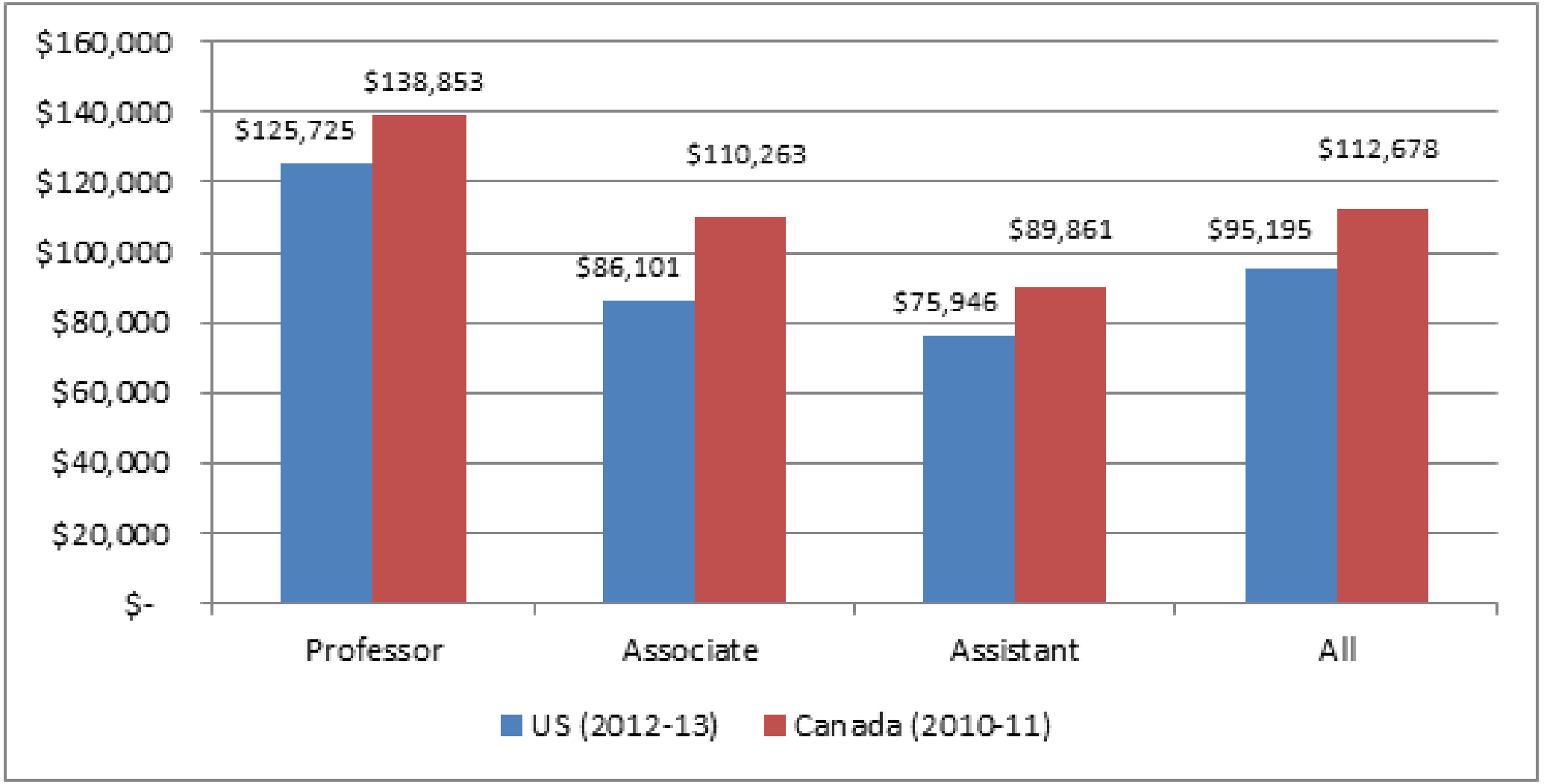
Professor salaries – selected institutions

- 2011



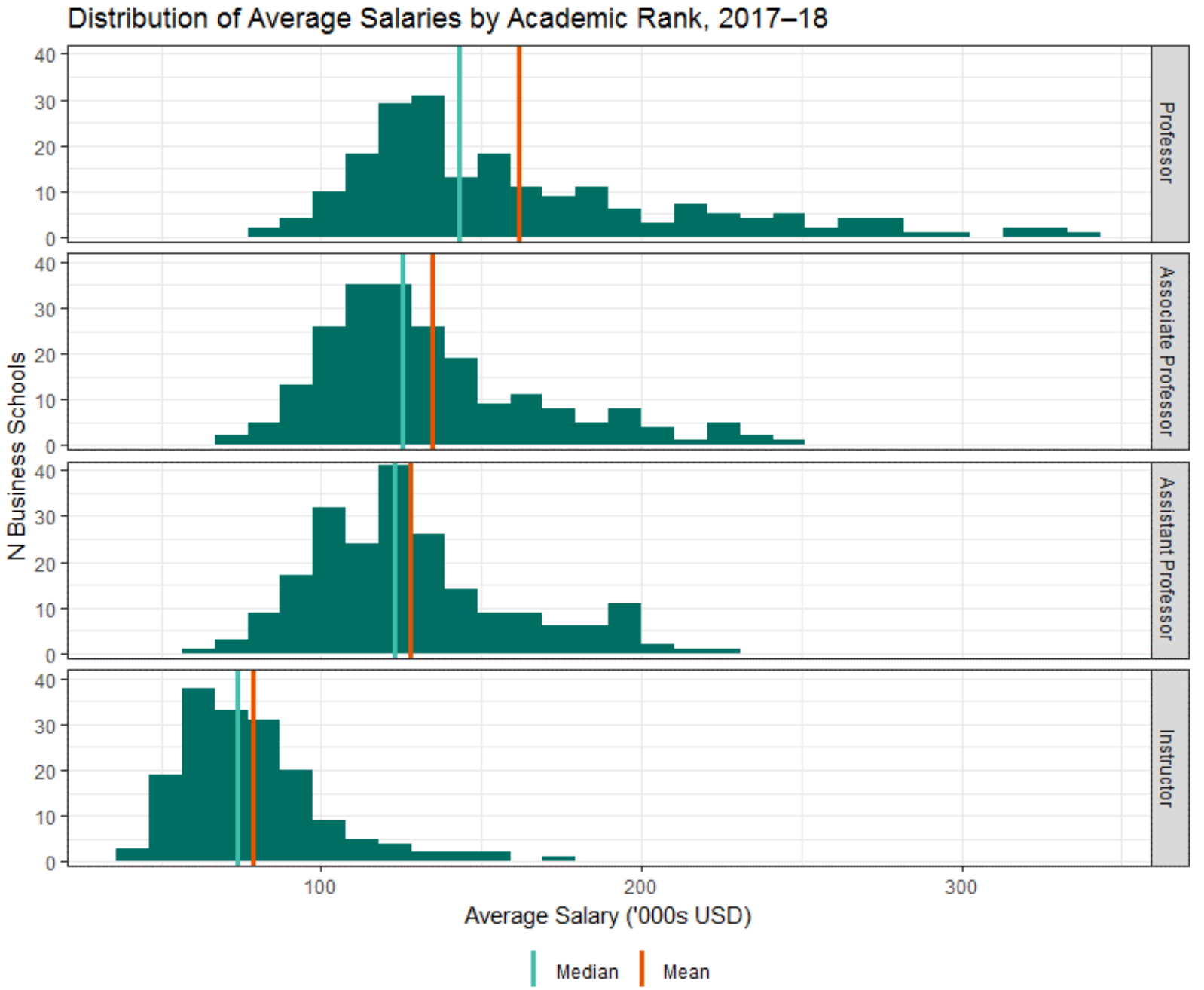
http://higheredstrategy.com/data-point-of-the-week-comparing-academic-salaries-3/

Professor salaries – by seniority



http://higheredstrategy.com/faculty-salary-data-you-should-probably-ignore/

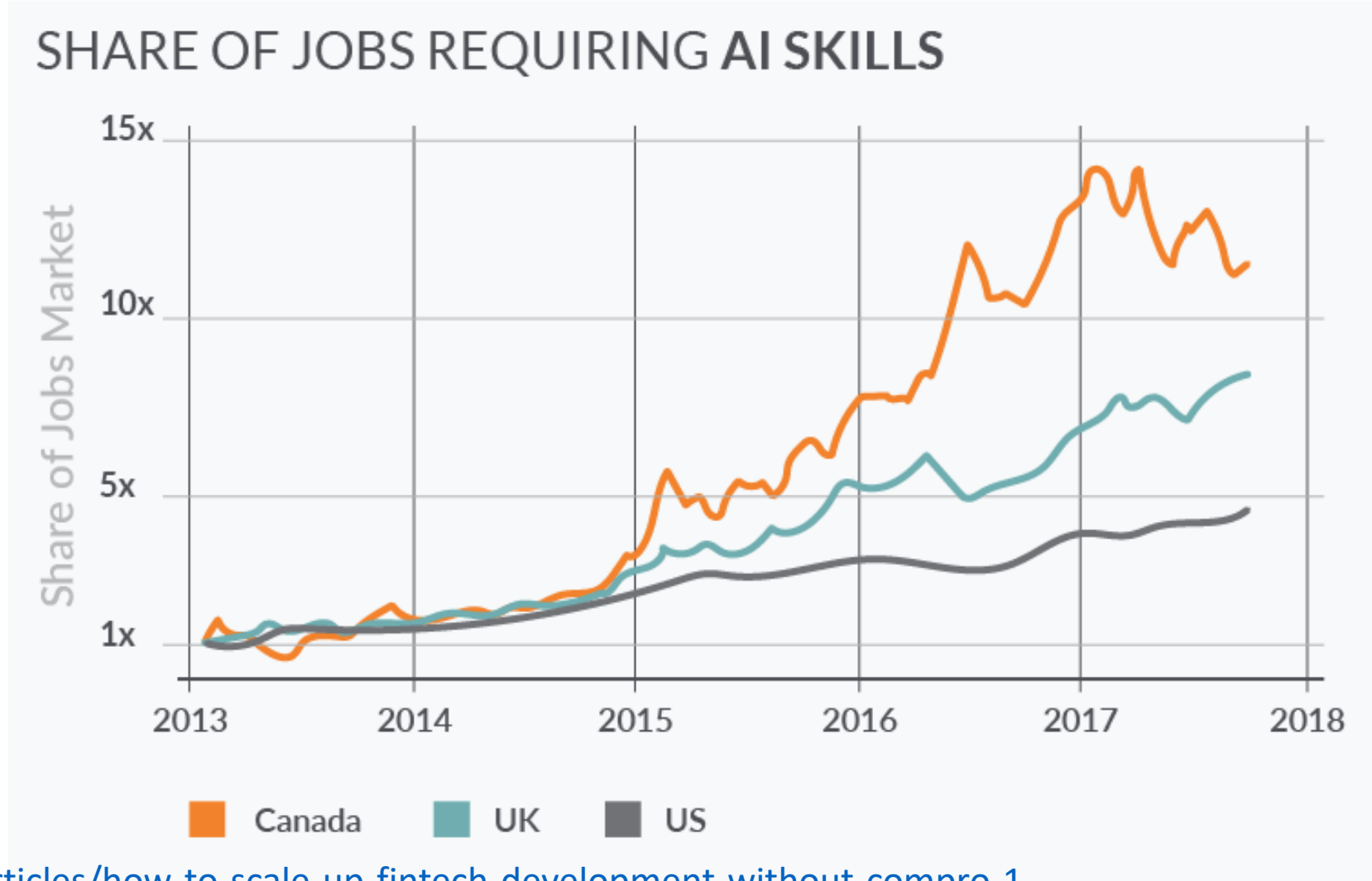
Professor salaries – distribution (USA)



https://aacsbblogs.typepad.com/dataandresearch/global-salary-survey/


Some numbers about Data Science / Analytics

Some skills are high in demand…



https://dzone.com/articles/how-to-scale-up-fintech-development-without-compro-1

HOT JOBS

AI Job Postings More Than Doubled in 2017

Job postings per million Canadian postings

Source: Indeed Canada

According to a Gartner report, **Data Science & Analytics | AI will create 2.3 million jobs.**

More than **50,000 Data Science & Machine Learning jobs are currently vacant** due to the dearth of qualified talent.

75% of Indian companies have already started investing or are going to invest in Data science and Machine Learning.

Gartner studies show that AI technologies will be in almost every new software product by 2020.

The overall data science platform market is expected to grow from **USD 19.58 billion in 2016 to USD 101.37 billion by 2021**, at a CAGR of 38.9% from 2016 to 2021.

At **34% projected growth** between now and 2024, statisticians are among the fastest-growing job fields tracked by the Bureau of Labor Statistics.

According to IBM, an increment by **364,000 to 2,720,000 openings** will be generated in the **year 2020** for Data Scientists. This demand will only grow further to an astonishing 700,000 openings.

https://bits-pilani-wilp.ac.in/campaign-cluster/m-tech-data-science-engineering-retail.php

Neurotech companies old and new

- *Established, clinical:*
  - Cochlear implants: Oticon, Cochlear, Advanced Bionics
  - DBS/neurostim: Medtronic
  - Imaging/diagnostics: Philips, Siemens, GE, 3M, etc.
- *Established, research:*
  - EEG: Biosemi, BrainVision, Rypple, Flywheel, many others
- *New, clinical:*
  - Kernel, Neuralink, Novela, Nexeon, OccamzRazor, Cognito Therapeutics, etc.
  - Akili Interactive, Pear Therapeutics
- *Consumer (non-invasive BCI & neurostim):*
  - CTRL-Labs, Thync, Halo, OpenBCI, MeloMind, many more
  - Software: Neurable, PEER, Mindlyft, oMind, etc.

Employers in **Canada** who look for **Neurotech** skills

- Synaptive Medical
- Perimeter Medical
- Conavi Medical
- Huron Technologies
- Novela Neurotech
- Interaxon (PEER, HealthTechConnex, MuseMonitor)
- Avertus
- CloudDx
- Mindset

Related companies in health: Winterlight Labs, PocketHealth, many more

And, of course: **AI** (Integrate AI, Element AI, Layer 6, many more)

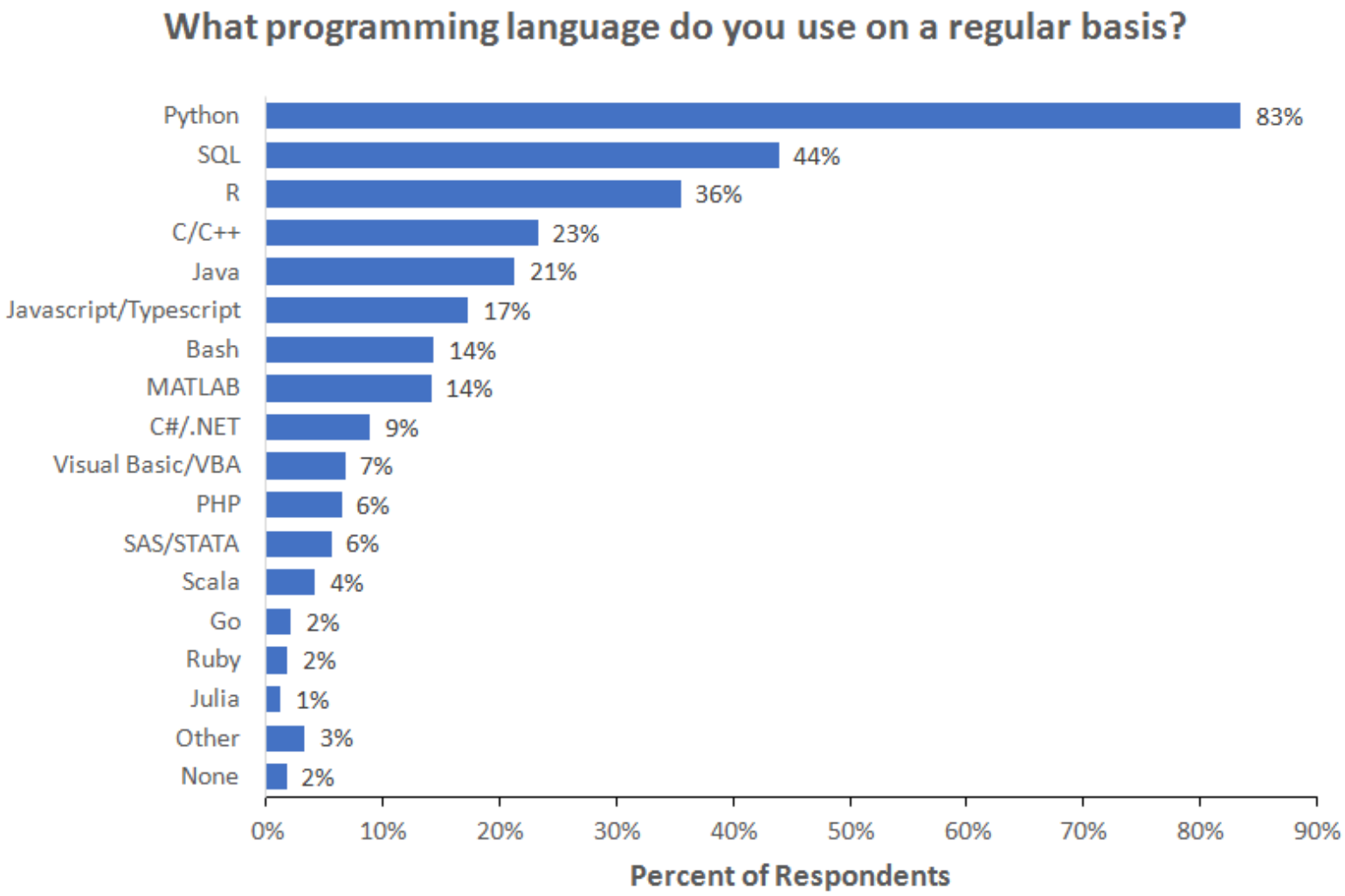
Value that neuroscientists bring to neurotech (and other) companies

- Credibility! (A qualified scientist on staff is valuable in itself)
- Rigour
- New insights, up-to-date knowledge
- Communications & reporting skills
- Quick analysis and synthesis of complex information
- Ability to manage projects and independent work
- Understanding of how to measure human behaviour
- *New hotness*: ML, Deep learning, AI
- Coding, Analysis
- Technical/specialist insights

Data Science/AI/ML

- Skills in coding, analytical thinking, experimentation, data cleaning
- What do you need to get started?
  - Python ML tools (SciKit Learn, NN toolboxes like TensorFlow)
  - Jupyter
  - MySQL
  - R (optional)
  - ~~Matlab~~
- ***Insight Data Science*** *fellowships* are a great way to start, and many neuroscientists have successfully transitioned to industry through Insight

Most useful skill for a data scientist: **programming**!



Note: Data are from the 2018 Kaggle Machine Learning and Data Science Survey. You can learn more about the study here: http://www.kaggle.com/kaggle/kaggle-survey-2018. A total of 18827 respondents answered the question.

Help a company to hire you

- BRING FUNDING! (Canada version)
  - Mitacs (Up to 40% of postdoc or grad student salary for up to two years)
  - OCE (up to 40% of postdoc salary for a year)
  - NSERC Engage ($25k for a project with an academic lab)
  - SRED (60-80% of high risk R&D costs including salaries are reimbursed through Canadian tax credits)
- DEVELOP YOUR SKILLS
  - Learn to code
  - Learn basic management tools
  - Do a skills boot camp (data science, ML, AI)
- SHOW OFF YOUR REPO AND WHAT YOU CAN DO
- DON’T BE AFRAID TO BUG THE PEOPLE YOU WANT TO WORK FOR
- TAKE A JOB THAT’S NOT A PERFECT FIT AND GROW THE ROLE

Hacking your way to business knowledge

- Take business courses & programs at your institute
  - If they won't let you then sneak into Executive MBA courses anyway
- Take a policy development course in the poli sci department
- Learn business shorthand
- Find mentors and ask for their help
- Learn management skills

Read these books no matter where you end up.
They'll also help you in academia or the public sector.

How to think about a career trajectory in the private sector

- ADVANCEMENT CAN HAPPEN FAST
  - This isn't academia; there's no paying your dues.
  - If you're effective and people like you, opportunities will seek you out
- YOU WILL CHANGE COMPANIES MORE THAN ONCE
  - Average time a tech worker spends at one company: 2 years
  - Average time a tech executive spends at one company : 4.5 years
- SPECIALISTS CAN BECOME INDISPENSIBLE
- MANAGERS CAN GENERALIZE AND ADVANCE
- TALENT, HARD WORK & GOOD IDEAS GO FAR, but COMMUNICATION SKILLS ARE ESSENTIAL
  - Tell people what you're doing, where you're succeeding, and where you're failing
  - Send updates to your boss weekly
  - Socialize your ideas with teammates to win support before you pitch them to senior management

Remember: YOU'RE A SCIENTIST and YOU CAN FIGURE OUT BUSINESS

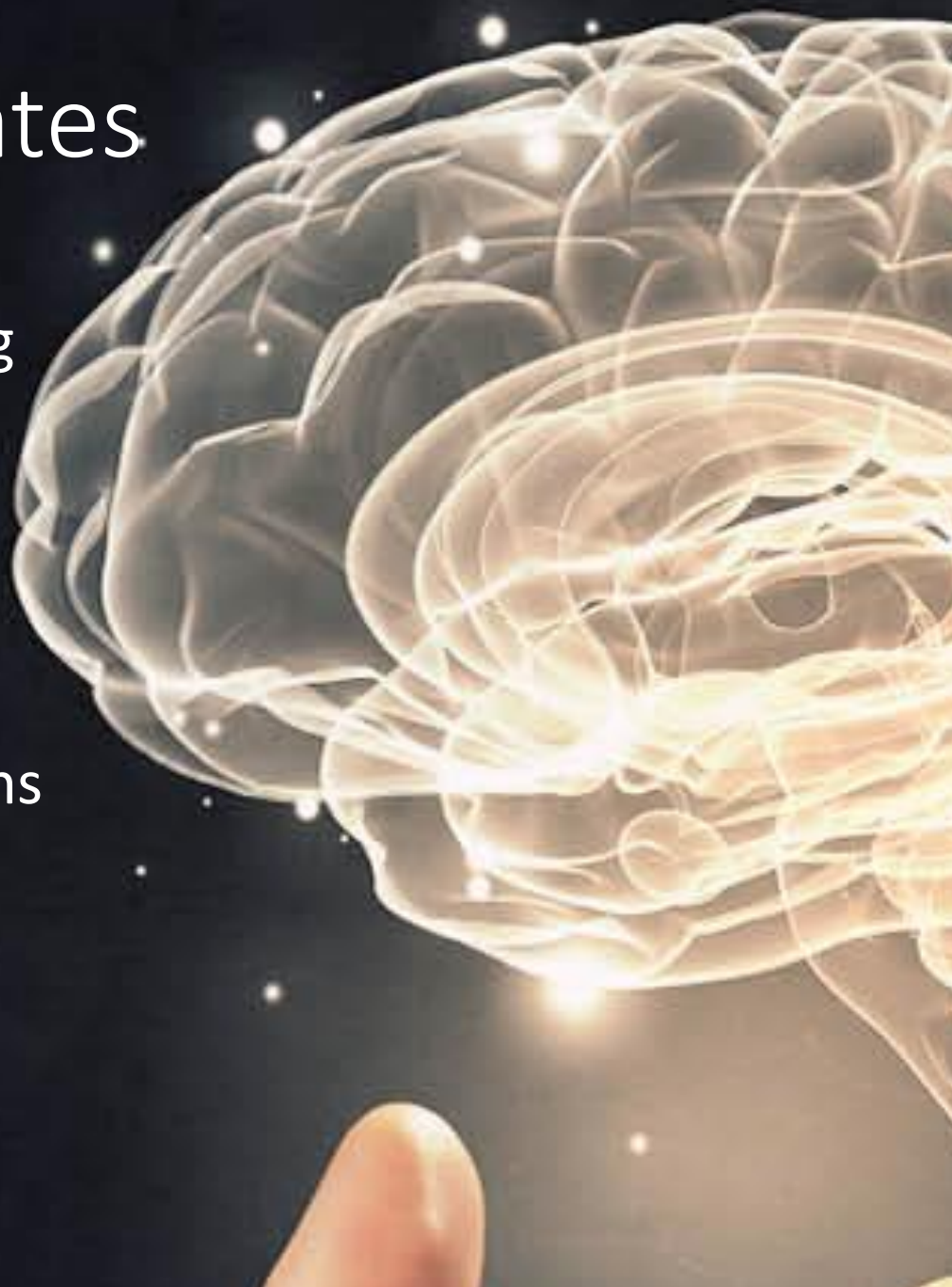
25 technical skills most in demand in 2019

1. Cloud computing
2. AI
3. Analytical reasoning
4. People management
5. UX (use-centered) design
6. Mobile App development
7. Video production
8. Sales leadership
9. Translation
10. Audio production
11. Natural language processing
12. Scientific computing
13. Game development
14. Social media marketing
15. Animation
16. Business analytics
17. Journalism
18. Digital marketing
19. Industrial design
20. Competitive strategies
21. Customer service systems
22. Software testing
23. Data science
24. Computer graphics
25. Corporate communications

https://www.cnbc.com/2019/01/08/the-25-most-in-demand-technical-skills-of-2019-according-to-linkedin-.html

Skills of Neuroscience graduates

- Analyze ideas and information
- Communicate clearly, both orally and in writing
- Design experiments and conduct studies
- Gather, analyze and interpret data
- Identify and understand needs
- Inform and explain ideas
- Make critical decisions under stressful situations
- Observe and compare people, data and things
- Perceive and understand individuals
- Computational modelling
- Neuroimaging
- Manage projects and collaborators



TRANSFERABLE SKILLS for Early-Career Researchers

Research

Citizen Science
Data analysis
Disciplinary knowledge/terminology
Ethics/integrity
Grant application writing
Interdisciplinarity
Literature use/management
Open Access publishing
Open Data management
Open Education
Open Evaluation
Open Licensing
Open Methodology
Open Source
Project/time management

Career Development

Career planning/assessment
CV writing
Interview techniques
Job searching/application
Skills documentation/verification
Skills gap identification/development

Digital

Information accessing/retrieval
Information presentation/visualisation
Information processing/exchange
Software usage/development
Programming

Communication

Academic writing
Formal correspondence
Oral presentation
Science for non-technical audiences
Science for policy making
Social media/webinar usage

Mobility

Intercultural awareness/communication
Intersectoral awareness/experience
Foreign language skills

Cognitive

Abstraction/creativity
Analysis/synthesis
Critical thinking/problem solving
Organisation/optimisation

Enterprise

Commercialisation
Entrepreneurship
Innovation/knowledge transfer
Intellectual Property Rights (IPR)
Legal/business standardisation
Patenting

Teaching & Supervision

Course development/assessment
Exam preparation/assessment
Mentoring/supervising students
Teaching and learning theories/methods

Interpersonal

Conflict management
Discipline/perseverance
Diversity awareness
Leadership/team work
Negotiation
Independence/responsibility
Networking
Rhetoric/argumentation
Stress tolerance
Taking on responsibility

eurodoc
The European Council of Doctoral Candidates and Junior Researchers

Professional Development strategies

- Tailor your education!
- Start thinking about your future now!
- Take advantage of PD opportunities
  - School of graduate studies
  - Clubs / graduate program / associations…
- Be serious about developing transferable skills
- Be critical and make realistic plans
- Don’t forget about your graduate project ;-)

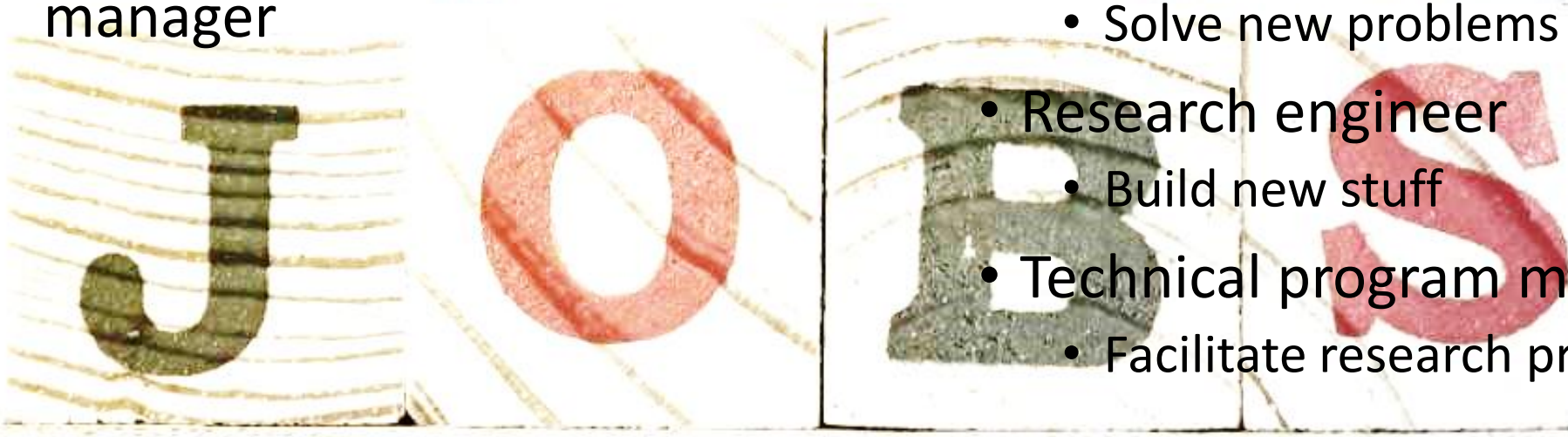
Understanding job descriptions…

Different broad roles

- Product vs R&D
  - Product = optimization of solution
  - R&D = new solutions
- Specialist vs Generalist
- Individividual contributor vs manager

Fancy titles

- User experience (UX) researcher
  - End user focused job
- Data scientist
  - Leverage data
- Research scientist
  - Solve new problems
- Research engineer
  - Build new stuff
- Technical program manager
  - Facilitate research programs



https://tanyajonker.com/essays/industry-jobs


OUR GREATEST WEAKNESS LIES IN
GIVING UP.
THE MOST CERTAIN WAY TO
SUCCEED
IS ALWAYS TO TRY JUST ONE MORE TIME.
BEINSPIREDCHANNEL.COM